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REVISION A-1

ENGINEERING DIRECTORATE (NE) AND ENGINEERING SERVICES CONTRACT(ESC) LABORATORY SAFETY AND CHEMICAL HYGIENE PLAN

SEPTEMBER 28, 2015

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ABBREVIATIONS, ACRONYMS, AND SYMBOLS

ALC	Authorized Laboratory Capability
CCAFS	Cape Canaveral Air Force Station
CFR	Code of Federal Regulations
EH	Environmental Health
EHSO	ESC Hygiene and Safety Officer
ESC	Engineering Services Contract
FM	Factory Mutual
GM	ESC Group Manager
GPES	Goal Performance Evaluation System
HARA	Hazard Analysis and Risk Assessment
HCP	Hearing Conservational Panel
HMIS	Health Management Information System
HSO	Hygiene and Safety Officer
IARC	International Agency for Research on Cancer
ICE	in case of emergency
ISC	Institutional Services Contract
KDP	Kennedy Documented Process
kg	kilogram
KNPD	Kennedy NASA Policy Directive
KNPR	Kennedy NASA Procedural Requirements
KSC	Kennedy Space Center
L	liter
LC50	median lethal concentration
LD50	median lethal dose
LM	Laboratory Manager
LMP	Laboratory Management Plan
LSCHP	Laboratory Safety and Chemical Hygiene Plan
MESC	Medical and Environmental Service Contract

mg	milligram
MSDS	Material and Safety Data Sheet
NE	NASA Engineering and Technology Directorate
NFPA	National Fire Protection Association
NHSO	NASA Hygiene and Safety Officer
NTP	National Toxicology Program
OHF	Occupational Health Facility
OSHA	Occupational Safety and Health Administration
PI	principal investigator
POC	point of contact
PPE	personal protective equipment
ppm	part per million
PWQ	Process Waste Questionaire
Q-KESS	QinetiQ – Kennedy Engineering Services System
RoC	Report on Carcinogens
SDS	Safety Data Sheets
SHE	Safety, Health, and Environmental
SHE&MA	Safety, Health, Environmental, and Mission Assurance
SME	subject matter expert
SOP	Standard Operating Procedure
STD	Standard
UG	User Guides
UL	Underwriters Laboratories

REFERENCES

29 CFR 1910.1200	OSHA Standards: Hazard Communication
29 CFR 1910.132–138	OSHA Standards: Personal Protective Equipment
29 CFR 1910.1450	OSHA Standards: Occupational Exposure to Hazardous Chemicals in Laboratories
29 CFR 1960	Basic Program Elements for Federal Employees
ESC-SOP-2.6	Universal Waste Management
ESC-SOP-3.16	Hazardous Energy Control Program (Lockout/Tagout)
ESC-SOP-3.17	Safety Inspection and Corrective Action
ESC-SOP-3.22	Industrial Ventilation and Indoor Air Quality
ESC-SOP-3.30	Personal Protective Equipment
ESC-SOP-3.7	Mishap and Close Call Investigation
KDP-KSC-P-1473	Safety & Mission Assurance Mishap Notification Process
KDP-KSC-P-3001	Warning, Alerting, and Evacuation
KDP-KSC-P-3215	Supervisor's Safety Inspections
KDP-KSC-P-3241	KSC Supervisor's Required Safety and Health Activities
KDP-KSC-P-3243	KSC Annual Facility Safety Inspections (29 CFR 1960)
KDP–KSC-P-5458	Engineering and Technology Directorate Laboratory Capabilities Determination Process
KNPR 1840.1	KSC Hazard Communication Program
KNPR 1840.19	KSC Industrial Hygiene Program
KNPR 8500.1	KSC Environmental Requirements
KNPR 8715.3-1	KSC Safety Procedural Requirements, Volume 1, Safety Procedural Requirements for Civil Servants/NASA Contractors
KSC-PLN-2322	Engineering And Technology Directorate (NE) Laboratory Management Plan
KSC-UG-2816	Institutional Safety and Mission Assurance Division Safety Checklist, Example and Template User Guide
NASA-STD-8719.11	Safety Standard for Fire Protection
NPR 4100.1D	NASA Materials Inventory Management Manual

REFERENCES (CONT.)

NPR 8621.1	NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping

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1. INTRODUCTION

The safety and health of employees is a high priority at the Kennedy Space Center (KSC). The NASA Engineering and Technology Directorate (NE) and the Engineering Services Contract (ESC) are both fully committed to laboratory safety and health. The purpose of the Laboratory Safety and Chemical Hygiene Plan (LSCHP) is to document the approach for achieving a safe and healthy work environment. This approach is designed to help employees protect themselves from hazards while working in the NE laboratories. The LSCHP aids in the implementation of the requirements of KNPD 1800.2, KSC Hazard Communication Program, KNPR 8715.3-1, KSC Safety Procedural Requirements, Volume 1, Safety Procedural Requirements for Civil Servants/NASA Contractors, KNPR 1840.19, KSC Industrial Hygiene Program, and KSC-PLN-2322, Engineering and Technology Directorate (NE) Laboratory Management Plan. These documents comply with the following Occupational Safety and Health Administration (OSHA) standards: 29 CFR 1910.1200, Hazard Communication and 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories.

1.1 Scope

The LSCHP establishes roles, areas of responsibility, and protocols for activities, procedures, and work practices to be followed by all civil servants, ESC employees, guest researchers, interns/students, and visitors working in the NE laboratories. KSC-PLN-2322, Engineering and Technology Directorate (NE) Laboratory Management Plan identifies the laboratories where this LSCHP is applicable. Laboratory-Specific Management Plans (LMPs), Authorized Laboratory Capability (ALC) documents, and ESC Standard Operating Procedures (SOPs), which are listed in Appendix A, expand on hazards addressed by this plan.

1.2 Responsibilities

The Director of NE is responsible for the overall safety and management of the NE laboratories and has delegated specific responsibility for the safe and successful operation of each laboratory, through the Division and Office Chiefs, to the NASA Laboratory Managers (LMs).

The LM is the ranking safety officer for their assigned laboratories and is responsible for the day-to-day operations with the laboratory. The responsibilities are:

- ensuring that personnel present or working in their laboratory know and follow the laboratory rules,
- ensuring that employees are provided with general laboratory and site-specific training to identify occupational hazards and the protective measures necessary to prevent or reduce exposure to these hazards,
- ensuring access to Safety Data Sheets (SDSs) for materials and chemicals in the laboratory,
- reviewing the hazards associated with those materials and chemicals with employees and ensuring that the employees are properly trained in the handling and disposal of hazardous materials and chemicals,

- ensuring that personal protective equipment (PPE) is available,
- complying with the legal and regulatory requirements concerning regulated substances and activities, and
- working with the NHSO and EHSO to support environmental health requirements.

The ESC Laboratory Group Manager (GM) works with the LM to ensure safety in the laboratory. The GM responsibilities are:

- ensuring that workers under their supervision know and follow the laboratory rules,
- ensuring that employees are provided with general laboratory and site-specific training to identify occupational hazards and the protective measures necessary to prevent or reduce exposure to these hazards,
- ensuring access to SDSs for materials and chemicals used in the laboratory,
- reviewing the hazards associated with those materials and chemicals with employees and ensuring that the employees are properly trained in the handling and disposal of hazardous materials and chemicals,
- ensuring that personal protective equipment (PPE) is available,
- performing inspections in accordance with ESC-SOP-3.17, Safety Inspection and Corrective Action,
- complying with the legal and regulatory requirements concerning regulated substances and activities,
- working with the NHSO and EHSO to support environmental health requirements, and

Laboratory workers are responsible for the following:

- reviewing and understanding the LSCHP,
- complying with laboratory rules, regulations, and procedures,
- reading SDSs and being familiar with information provided for hazardous chemicals to which they may be exposed, including exposure limits and signs and symptoms of exposure,
- attending required safety and hygiene training,
- using, maintaining, and storing PPE as required,
- informing the LM or GM of any medical work restrictions,
- reporting concerns with equipment or hazardous materials in the workplace to their LM or GM.

The Director of NE has designated the NASA Hygiene and Safety Officer (NHSO) as the responsible chemical hygiene officer. The ESC Safety, Health, Environmental, and Mission Assurance (SHE&MA) Manager has designated the ESC Hygiene and Safety Officer (EHSO) as the responsible chemical hygiene officer.

The NHSO and EHSO are responsible for the following:

- maintaining chemical hygiene and laboratory safety documentation,
- ensuring that the LSCHP is reviewed annually by affected organizations,
- providing consultation on safe work practices for hazardous materials,
- providing guidance on the disposal of chemicals and hazardous materials in the laboratory in accordance with KNPD 8500.1, KSC Environmental Management,
- providing support to LM, PI(s), and POCs for interpretation of standards, applicability of specific requirements, and or recommendations for improvements to laboratory operations or processes,
- performing safety and health inspections/observation
- approving the procurement of chemicals and hazardous materials in the laboratory,
- providing guidance for the purchasing and maintenance of PPE
- for engineering level operations/tests, determining the hazard/risk classification for the overall operation
- providing guidance on implementation of NASA, KSC, Federal, State, and local regulations concerning regulated substances,
- coordinating environmental health hazard assessments for new procurements and process changes, and
- ensuring that the LM maintains a list of chemicals and hazardous materials for the laboratory.

2. GENERAL SAFETY PRINCIPLES AND PRACTICES

Laboratory workers have the responsibility to plan and execute laboratory operations in a safe manner. ESC employees are required to adhere to the subject-specific SOPs listed in Appendix A. Civil servants are encouraged to use these SOPs as guidance in performing specific duties within laboratories and shops. The responsibilities of employees are to:

- stop any activities they consider to be unsafe,
- report unsafe conditions to area employees, the LM and/or GM,
- know the location of exits, emergency showers, eyewash stations, fire extinguishers, fire pull stations, spill kits, and telephones,
- not block access to exits, emergency equipment, or utility controls,
- use PPE as defined in specific-LMP or ALC documents,

- attend assigned training per the LMP and ALC
- not smoke and chew gum or tobacco in the laboratory,
- apply cosmetics, or take medicine in laboratories or designated work areas where hazardous materials are used
- not use laboratory refrigerators, ice chests, cold rooms, ovens, or any other laboratory equipment, including glassware, for handling or storage of food and beverages,
- not smell or taste chemicals,
- not pipette by mouth,
- not open pressure vessels until the internal pressure has been vented,
- not use damaged glassware or equipment,
- not use extension cords as permanent wiring (as is prohibited by NFPA 1 [Fire Code]) or electrically overload extension cords,
- use a fume hood, exhaust system, or scrubber for operations involving toxic, flammable, carcinogenic, biological, or easily aerosolized materials,
- put guards in place per manufacturer's instructions
- follow the established procedures for locking out and tagging out equipment for the isolation of hazards during maintenance or repair of equipment or systems in accordance with KNPR 8715.3-1, KSC Safety Procedural Requirements, Volume 1, Safety Procedural Requirements for Civil Servants/NASA Contractors and ESC-SOP-3.16, Hazardous Energy Control Program (Lockout/Tagout),
- constrain long hair, loose clothing, and jewelry when working in the laboratory or around machines with moving parts,
- wash hands with soap and water immediately after working with any laboratory chemicals or hazardous materials, even if gloves have been worn, and
- avoid distracting or startling other workers.

2.1 Chemicals Developed in the Laboratory

Before chemicals are mixed for the first time, the principal investigators (PIs) will complete a Hazard Inventory and Mitigation Worksheet for approval by the LM. Information about the following items are used to complete the Hazard Inventory and Mitigation Worksheet: all hazards of all possible products, exothermicity of the reaction, quantities of the reactants, kinetics of the reaction, and any other pertinent information. The LM uses the information provided by the PI and other subject matter experts (SMEs) to determine whether the experiment can be performed within the protocols of existing ALC documents.

2.2 Housekeeping

Laboratory employees are responsible for:

- cleaning up the work area after an operation or at the end of each day,
- keeping laboratory areas, especially laboratory benches, clean and free of clutter,
- cleaning up spilled chemicals as quickly and safely as possible. Detailed instructions for chemical spill response will be described in the specific LMP or ALC documents,
- storing items only in designated areas,
- depositing waste in appropriate receptacles,
- not using stairways and hallways as storage areas, and
- placing broken glass and sharp instruments in designated disposal boxes.

2.3 Working Alone

Employees should coordinate schedules to avoid working alone whenever possible. However, working alone is permitted in laboratories unless ALC documentation requires a buddy system for hazardous work. If it is essential to perform hazardous work in a laboratory, the work should be conducted with a second person present in the near vicinity to provide help in case of emergencies. The buddy system is a procedure in which two people are able to monitor and help each other in case of emergencies.

2.4 Unattended Operations

2.4.1 Planned Operations

Frequently, laboratory operations must run continuously or overnight. Equipment and experiments that run unattended during the day or overnight have the potential to cause significant problems and harm to employees, facilities, and equipment. Check with the LM or GM to determine if a laboratory operation can be left unattended in a safe manner.

Laboratory employees will use the following basic guidelines in the design of an experiment or project to be left unattended:

- develop an ALC document with a defined protocol that includes an analysis addressing potential interruptions in electric, water, inert gas, and other services and provides containment for hazardous materials,
- design operations to be “fail-safe,” so that one malfunction will not cause additional failures,
- use closed doors with either cipher locks or keyed-entry to secure laboratory areas and prevent unauthorized access during an unattended laboratory operation,
- post a warning notice with emergency contact information and safe shutdown operations on the door or near the process, and

- provide regular surveillance of unattended or automatic laboratory operations.

2.4.2 Unplanned Operations

ALC documents will include contingency plans for emergencies or system disruptions (such as loss of power or an inoperable fume hood).

2.5 Procurement, Labeling, Inventory, Storage, and Transporting of Chemicals

2.5.1 Procurement of Chemicals

- The procurement or acquisition of any new chemical or material (e.g. vendor-supplied materials or materials brought in by a visiting researcher) requires the approval of the NHSO or EHSO. A new chemical or material is defined as one that is not documented in the laboratory baseline.
- New chemicals or materials will undergo hazard assessments by either MESC or the HSO or EHSO. The hazard assessment will be documented on either KSC Form 28-1044 NS (Environmental Health and Environmental Services Support) or the ESC SHE&MA Procurement Checklist.
- Order chemicals in only the smallest reasonable quantities that are needed to do the job, when possible/practical.
- Consider less hazardous chemicals as an alternative, whenever possible.
- Do not accept chemical containers without an adequate, identifying label and an MSDS.

2.5.2 Labeling of Chemicals and Laboratory Samples

The LM or designee will ensure that all containers have adequate labeling per KNPD 1800.2, KSC Hazard Communication Program.

- All labels will be legible, written in English, and prominently displayed on the container.
- Do not remove or deface labels.
- Handle containers without labels as hazardous waste (see Section 6).
- Laboratory samples will be labeled according to LMPs.
- Chemicals purchased from a manufacturer or prepared for downstream users will be labeled in accordance with 29 CFR 1910.1200
    - Labels will include the following information:
        - name of the chemical,
        - concentration,
        - Health Management Information System (HMIS) designation of the chemical such as health, flammability, and reactivity, and
        - name and contact information of the manufacturer or preparer.

- If a chemical is transferred to another container, that container will also be labeled unless the chemical is used immediately.

2.5.3 Chemical and Materials Management

The LM or designee will ensure that there is a list of hazardous chemicals and materials used by their laboratory. The method of maintaining this list will be described in the LMP. Additionally, the LM is responsible for performing an annual inspection, whereby the chemicals, the containers, or materials are visually inspected for deterioration and integrity.

During laboratory operations, employees are responsible for

- checking the expiration date of chemicals and materials per NPR 4100.1D, NASA Materials Inventory Management Manual,
- segregating expired chemicals or materials and affixing one of the following labels to the container: KSC Form 50-251, 50-251A, or 50-251B, and
- performing an engineering review to determine if the chemicals or materials can be used for other tasks. If can be used, label the container accordingly. If not, dispose of in accordance with Section 6.

2.5.4 Storage of Chemicals

Laboratory employees are responsible for:

- closing chemical containers and storing properly when not in use,
- storing chemicals in designated areas,
- segregating chemicals into compatible groups; which reduces chemical reaction should a spill or leak occur,
- storing chemicals in the smallest practical quantities,
- storing flammable, combustible chemicals and materials in cabinets approved by Underwriters Laboratories (UL) or Factory Mutual (FM) or in refrigerators or freezers that comply with NASA-STD-8719.11, Safety Standard for Fire Protection,
  - Do not store combustible material in or near flammable storage cabinets
  - Locate storage cabinets for flammable liquids at least 15 feet from laboratory exits
- visually inspecting chemicals, the containers, and materials for deterioration and integrity,
- properly disposing of deteriorated chemicals and containers according to Section 6, and
- controlling access to areas where chemicals are stored.

2.5.5 Transporting Chemicals

Laboratory employees are responsible for the following:

- using leak-resistant, unbreakable secondary containment, when leaving the laboratory or transporting between stockrooms and laboratories,
- using "Freight only" elevators to transport of chemicals, when possible,
- avoiding high traffic areas,
- using a cart with raised edges suitable for the load and whenever possible, using a secondary containment method, and
- contacting SHE, NHSO, or EHSO to determine how to transport chemicals off-Center.

Laboratory employees are not allowed to transport:

- chemicals or hazardous materials in privately owned vehicles (POV),
- explosives, or
- hydrazine

2.6 Laboratory Inspections

ESC Safety, Health, and Environmental (SHE) performs safety walk downs of assigned laboratories and developmental shops in accordance with ESC-SOP-3.17, Safety Inspection and Corrective Action.

NASA Safety audits NE laboratory and ESC safety and health activities for compliance with applicable Federal and KSC safety requirements, using KSC-UG-2816, Institutional Safety and Mission Assurance Division Safety Checklist, Example and Template User Guide for guidance.

2.7 Safety Data Sheet (SDS)

An SDS, formerly MSDS, is a document that contains information on the potential hazards (health, fire, reactivity, and environmental) of a chemical or material and how to work safely with that chemical or material. It is prepared by the supplier or the manufacturer of the material and is delivered to the customer, along with the hazardous material.

SDSs for most laboratory chemicals and materials are available online in the NASA/KSC Materials Safety Data Sheet System. If an SDS for a hazardous material is not available in the archive, the LM or the designated representative should contact MESC Work Control at 321-867-2400 to obtain the SDS and have it added to the archive. Alternatively, SDSs can be maintained in the laboratory. The laboratory employee may also contact the NHSO or EHSO for assistance.

3. EMERGENCY PROCEDURES

Emergency procedures for events such as fires, chemical spills, power outages, or mishaps will be listed in Laboratory-Specific Management Plans or ALC documents and will comply with the requirements of KDP-KSC-P-3001, Warning, Alerting, and Evacuation. Under no circumstances

will employees place themselves in a dangerous or hazardous situation during the implementation of emergency procedures and instructions.

4. REPORTING OF INJURIES AND ILLNESSES

Employees are required to report any laboratory close calls, mishaps, injuries, illnesses, or potential chemical exposures to their immediate supervisor in accordance with KDP-KSC-P-1473, Safety & Mission Assurance Mishap Notification Process. Accident records will be completed by the supervisor in accordance with NPR 8621.1, NASA Procedural Requirements for Mishap Reporting, Investigating, and Recordkeeping. Additional guidance for ESC employees can be found in ESC-SOP-3.7, Mishap and Close Call Investigation.

For emergencies requiring immediate medical attention, call 911 (321-867-7911 on a cell phone).

Employees will report to the KSC Occupational Health Facility (OHF) for medical evaluation when

- they report that they have been injured,
- a spill, leak, or explosion exposes them to hazardous chemicals,
- they develop signs or symptoms associated with a potential chemical exposure, or
- there is any doubt about their medical condition.
- directed by the supervisor

The supervisor, LM, or GM will provide the OHF with copies of the MSDSs/SDSs for the chemicals involved.

Where employees are working at remote locations, the LM or GM is responsible for coordinating the provision of local medical services.

5. EXPOSURE MONITORING/MEDICAL SURVEILLANCE

The LM or GM is responsible for ensuring that health hazard assessments are performed when employees work where there is a potential exposure to hazardous noise, ionizing or non-ionizing radiation, toxic gas environments, highly hazardous chemicals, or certain regulated substances. The laboratory employee may be required to complete a medical screening exam or participate in a medical surveillance program.

MESC will assist with identifying potential hazards, perform surveillance monitoring if needed, and provide a written report of findings to the LM or GM. The LM and GM are responsible for reviewing the results of exposure evaluations with affected employees and for implementing any corrective actions identified in the evaluation. Records of exposure evaluations will be kept by MESC.

MESC will identify employee medical surveillance requirements. For medical surveillance, civil servants will schedule an appointment with the OHF, and ESC employees will contact the ESC Training Coordinator.

6. HAZARDOUS WASTE

Waste generated in the laboratory will be disposed of in accordance with KNPR 8500.1, KSC Environmental Requirements and ESC-SOP-2.6, Universal Waste Management. The HSO and EHSO can provide guidance in determining the safety needs, such as types of PPE, waste disposal methods, and decontamination procedures.

Further guidance is detailed in KSC Form 26-551, Process Waste Questionnaire (PWQ). This form is submitted for each type of operation that generates waste. In response to the PWQ, a Technical Response Package establishes how the waste is to be collected, segregated, stored, and transported. Laboratory workers are responsible for:

- depositing hazardous waste in appropriately labeled receptacles.
- not pouring hazardous waste down drains or putting in trash cans.
- not using laboratory fume hoods to dispose of volatile chemicals.

7. HAZARD CONTROL MEASURES

OSHA Standard 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories requires that laboratory employees implement appropriate control measures to ensure that chemical exposures are maintained below regulatory limits and as low as reasonably achievable. In general, control measures can be categorized as engineering controls, administrative controls, and personal protection. In addition to the OSHA requirements, this plan addresses other hazards encountered in the laboratory.

7.1 Engineering Controls

Engineering controls consist of various measures for reducing a hazard at its source or for separating employees from the hazard. In the laboratory, examples of engineering controls include:

- substituting less hazardous chemicals,
- providing adequate lighting,
- isolating a particular chemical operation,
- enclosing a potentially explosive reaction,
- using local exhaust, such as a fume hood, for an operation that produces toxic dusts, gases, smoke, fumes, or vapor,
- providing safety showers and eyewash stations,
- providing fire extinguishers, and

- providing cabinets for flammable and toxic chemicals.

7.2 Administrative Controls

Administrative controls consist of various policies and requirements that are established at an administrative level to promote safety in the laboratory. Safety and health considerations for all activities will be evaluated in accordance with KDP–KSC-P-5458, Engineering and Technology Directorate Laboratory Capabilities Determination Process and documented in an ALC.

7.2.1 Inspection of Laboratory Hoods and Local Exhaust Systems

It is the responsibility of the LM to ensure that laboratory hoods and local exhaust systems are inspected and approved for use. MESC evaluates laboratory hoods and local exhaust systems and certifies for use. Evaluations can be scheduled at 321-867-2400. Systems not passing inspection will be taken out of service immediately and will not be used until they have passed inspection. ISC repairs and maintains laboratory hoods and exhaust systems for most NE laboratories and can be contacted through the ISC Duty Office at 321-861-5050. ESC employees will follow the guidelines in ESC-SOP-3.22, Industrial Ventilation and Indoor Air Quality. For those laboratories not supported by MESC and ISC, the LM will ensure the proper operation of the system.

7.3 Personal Protective Equipment (PPE)

OSHA Standards 29 CFR 1910.132–138, Personal Protective Equipment require the use of employer-supplied PPE when other measures, such as engineering and administrative controls; have been shown to be infeasible or inadequate in eliminating or controlling the health hazard.

The use of PPE will always supplement, but never substitute for, appropriate engineering and administrative controls. The LM will ensure that all laboratory employees have and use the appropriate PPE. It is NE and ESC policy that the use of PPE by laboratory personnel, when required, be a condition of employment. Disregarding the PPE requirements defined in ALC documents, whether intentional or not, will result in personnel action.

PPE will be used as required by either the laboratory operational procedure, or the applicable shop instruction. ESC employees will follow ESC-SOP-3.30, Personal Protective Equipment. Any additional PPE requirements will be identified in LMP or ALC documents.

8. TRAINING

All employees working in NE laboratories or shops are required to complete the following courses:

- KSC-003-07, KSC Hazard Communication (Chemical Users)

- QG216KSC, Laboratory Health and Safety Training (refresher every two years)

9. RECORDS

- Medical consultation and exposure monitoring records are maintained by MESC Occupational Health
- Training and certification records will be maintained by the employee's organization.
- The NHSO and EHSO will ensure that the list of hazardous chemicals and materials is available on the NE SharePoint site.
- The records containing the results of the ESC safety inspections are available on QKESS.

APPENDIX A. ESC SOP REFERENCES

ESC Reference Number	SOP Title
ESC-SOP-2.6	Universal Waste Management
ESC-SOP-3.1	Fall Protection/Working at Heights Program
ESC-SOP-3.2	Employee Hazard Reporting System
ESC-SOP-3.3	Safety Variances
ESC-SOP-3.4	Hazard Communication
ESC-SOP-3.5	Area Safety Representative
ESC-SOP-3.6	Batteries and Battery Charging
ESC-SOP-3.7	Mishap and Close Call Reporting, Investigation, and Recordkeeping
ESC-SOP-3.8	Hot Work, New Construction, and Demolition Permit Program
ESC-SOP-3.9	Respiratory Protection Program
ESC-SOP-3.10	Radiation Protection Program
ESC-SOP-3.11	Compressed-Gas Cylinders
ESC-SOP-3.12	Automated External Defibrillators
ESC-SOP-3.13	Asbestos Awareness and Control
ESC-SOP-3.14	Hearing Conservation Program (HCP)
ESC-SOP-3.15	Ergonomics (Musculoskeletal Disorders)
ESC-SOP-3.16	Hazardous Energy Control Program (Lockout/Tagout)
ESC-SOP-3.17	Safety Inspection and Corrective Action
ESC-SOP-3.18	Confined-Space Entry Program
ESC-SOP-3.19	Extension Cord, Flexible-Cable, and Surge Suppression Usage
ESC-SOP-3.20	Hazardous Metals
ESC-SOP-3.21	Heat Stress
ESC-SOP-3.22	Industrial Ventilation and Control
ESC-SOP-3.23	Hand Tools
ESC-SOP-3.24	Portable Power Tools
ESC-SOP-3.25	Emergency Eyewash and Shower Equipment
ESC-SOP-3.26	Review and Approval of Hazardous Operations and Tests
ESC-SOP-3.27	Material Handling and Storage
ESC-SOP-3.28	Machine Guarding
ESC-SOP-3.29	Walking/Working Surfaces
ESC-SOP-3.30	Personal Protective Equipment
ESC-SOP-3.31	Maximum Work Time
ESC-SOP-3.32	Pregnancy at Work – Exposure to Reproductive Hazards
ESC-SOP-3.33	Laboratory Heating Sources
ESC-SOP-3.34	Cryogenic Safety
ESC-SOP-3.35	Personal Protective Equipment Procurement Program
ESC-SOP-3.36	Electrical and Arc Flash Safety
ESC-SOP-3.37	Adverse Weather and Lightning Protection
ESC-SOP-3.38	Magnetic Fields
ESC-SOP-3.39	Danger Tag Program
ESC-SOP-3.40	Emergency Procedures
ESC-SOP-3.41	Bloodborne Pathogens: Employee Exposure Control Plan
ESC-SOP-3.42	Stop Work Order Process

ESC Reference Number	SOP Title
ESC-SOP-3.43	Hazard Analysis and Risk Assessment (HARA)
ESC-SOP-3.44	Safety Monitoring of Hazardous Operations
ESC-SOP-3.45	Nanoscale Technology
ESC-SOP-3.46	Safety Audits
ESC-SOP-3.47	Biological Safety
ESC-SOP-3.48	Air-Reactive Chemicals
ESC-SOP-3.49	Organic-Peroxide Chemicals
ESC-SOP-3.50	Metal Working
ESC-SOP-3.51	Management of Safety, Health, and Environmental Requirements
ESC-SOP-3.52	Job Hazard Analysis